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discussed Russo's data. Two independent repetitions of his breeding experiments, one made in Italy, the other in England, have failed to confirm his conclusions, which therefore, as matters stand, have slight weight.

W. E. Castle.

Bussey Institution,
Harvard University,
June 12, 1911.

NOTES ON ICHTHYOLOGY

In the *Abhandlungen of the Akademie der Wissenschaften*, in Bavaria, Vol. IV, Münich, 1910, Victor Franz has an elaborate account of the bony fishes collected in Japan by Haberer and Döflein. This is an important paper, containing descriptions and figures of numerous new species.

In the Contributions from the Zoological Laboratory of Indiana University, No. 76, part 2, Dr. Carl H. Eigenmann gives a "Catalogue and Bibliography of the Fresh-water Fishes found in Tropical and South Temperate America," including all south of the latitude of the mouth of the Rio Grande. Dr. Eigenmann gives a discussion of the valid reasons which have led him to retain the generic name *Æquidens* in place of *Acara.*

In the *Bulletin of the Bureau of Fisheries,* Vol. XXIX, 1909, Jordan and Evermann discuss the "Salmonoid Fishes of the Great Lakes," with numerous plates, some of them in color. The name *Leucichthys* of Dybowski is adopted in place of the earlier name, *Argyrosomus,* of Agassiz, which was first used for a marine fish. Four new species of *Leucichthys* or lake herring are described, *L. supernas* from Lake Superior, *L. cyanopterus* from Lake Superior, *L. manitoulinus* from Lake Huron, and *L. ontariensis* from Lake Ontario. A new variety, *L. harengus arcturus,* is described from the west end of Lake Superior. Two new sub-generic names are adopted: *Thrissomimus* Gill for the ordinary lake herring, the name *Argyrosomus* being preoccupied; and *Cisco* for the deep-water forms. In this paper it is shown that the shore lake herring, instead of constituting a single species, are really several in number, at least six of them in the Great Lakes deserving recognition as species.

In the *Bulletin of the Bureau of Fisheries,* Vol. XXIX, 1909, Dr. Charles W. Greene discusses in detail the migration of the salmon in the Columbia River, treating with considerable fullness the methods by which individuals may be marked.

A number of tables are given illustrating the movement of the salmon, an average in the Lower Columbia being about seven and a half miles per day.

In the Bulletin of the Illinois State Laboratory of Natural History, Dr. Stephen A. Forbes gives a table and a series of maps illustrating the distribution of the different species of fishes, as traced in the state of Illinois. One hundred and fifty native species are recognized, all of them represented in the neighboring states, variously extending into the rather monotonous basin of Illinois, in accordance with the character of the water. In the absence of geographical barriers, the causes influencing their distribution are climatic, geologic and ecological. A number of other generalizations are developed.

The British Museum of Natural History has issued the second volume of George A. Boulenger's important "Catalogue of the Fresh-water Fishes of Africa." This covers the catfishes, and a portion of the carp family. Most of the species are illustrated by good drawings.

In the *Annales de L'Institut Oceanographique,* of Prince Albert of Monaco, Dr. Louis Fage gives an account of the many forms of larval fishes taken in the deep-sea work of the Prince of Monaco.

In the *Philippine Journal of Science,* Vol. V, July, 1910, Mr. Alvin Seale describes four new species of fishes from Bantayan Island.

In the *Memoirs of the Indian Museum in Calcutta,* Vol. III, 1910, Dr. N. Annandale and J. T. Jenkins describe and figure numerous fishes taken in deep water by the steamer "Golden Crown."

In the *Memoirs of the Museum of Comparative Zoology,* at Harvard University, Vol. XXVI, 1911, William C. Kendall and Edmund L. Goldsborough record the species of shore-fishes taken by the *Albatross* in the South Seas, when in charge of Professor Alexander Agassiz. Numerous new species are described, and valuable notes are given on those recorded by previous authors.

In the *Proceedings of the United States National Museum,* Vol. 38, 1910, Jordan and Thompson discuss the "Gold-eye of Lake Winnipeg," an excellent food fish which has been generally overlooked by authors, *Amphiodon alosoides.*

In the same *Proceedings,* Vol. 39, 1911, Jordan and Thompson discuss the "Fishes of the Families *Lobotidæ* and *Lutianidæ,*" found in the waters of Japan.

In the same *Proceedings,* Vol. 39, 1911, the same authors discuss the species of the family *Sciænidæ* found in the waters of Japan.

In the same *Proceedings,* Vol. 38, 1910, Barton A. Bean and Alfred C. Weed discuss the "Venomous Toadfishes of South America" belonging to *Thalassophryne* and related genera, with figures of the different species and a discussion of the venomous spines by which they are armed.

In the same *Proceedings,* Vol. 39, 1911, Theodore Gill discusses the "Structure and Habits of the Wolffishes." The genus *Lycichthys,* based on *Anarrhicas latifrons,* is here fully defined. A new species, *Lycichthys fortidens,* from the North Atlantic, is described and figured.

In the same *Proceedings,* Vol. 38, 1910, William Converse Kendall describes a collection of fishes made in Labrador by Owen Bryant. Among these are certain sea trout not belonging to the ordinary brook-trout species, *Salvelinus fortinalis.* The species in question is provisionally identified as *Salvelinus stagnalis,* but it is possible that it is a species still undescribed. The name *Salmo immaculatus* was probably originally given to this species, but the name is preoccupied.

In the same *Proceedings,* Vol. 38, 1910, Barton W. Evermann and William C. Kendall compare the chub-mackerels, *Scomber colias,* of the Atlantic, with those of the Pacific, called *S. japonicus.* They find the two species different, in measuring the specimens examined, the head being especially larger in the Pacific fish—about 3¼ instead of 3⅔ in the length of the body. Comparison of other specimens made at Stanford University does not seem to bear out these differences, and the propriety of separating the Atlantic species from the earlier named Japanese form as *Scomber colias* is still doubtful.

In the same *Proceedings,* Vol. 37, 1910, Barton A. Bean and Alfred C. Weed discuss the Japanese genus *Anteliochimæra,* in which they show that the genus is probably identical with *Harriotta,* an Atlantic genus of *Chimæra.*

In the same *Proceedings,* Vol. 39, 1910, Barton W. Evermann and Homer B. Latimer give a "Catalogue of the Fishes," forty in number, known to inhabit the Lake of the Woods.

In the *Annals and Magazine of Natural History,* November, 1910, C. Tate Regan discusses the families of Zeidæ and Caproidæ.

In the same *Annals* Mr. Regan discusses the origin and evolution of the order of the flounders. He regards them as descended from perchlike fishes—the genus *Psettodes* with a spinous dorsal, being the most primitive of the group. He divides the flatfishes into four families, Bothidæ, Pleuronectidæ, Soleidæ and Cynoglossidæ. He finds no evidence that the flounders are related to *Zeus,* as suggested by Boulenger. The relation to the fossil genus *Amphistium* seems to be possible. In Regan's judgment this fish is a percoid, allied to *Psettus* or to *Platax.* The adjustment of the genera of flounders is somewhat different from that usually accepted.

In the *Proceedings of the Biological Society of Washington,* Professor T. D. A. Cockerell discusses the scales of various soft-rayed fishes. He finds in the structure of the scale valuable characters for the distinction of genera and subgenera, in different groups of fishes. This is the first critical study of scales with a view to using their characters in the classification of genera, and Mr. Cockerell's observation should be extended throughout ichthyology.

In the *Bulletin of the American Museum of Natural History,* Vol. XXVIII, 1910, John Treadwell Nichols discusses the occurrence of the pelagic pipefish, *Siphostoma pelagicum.* They occur especially in the drifting Gulf weed of the mid-ocean. Mr. Nichols has also examined the type of *Caranx forsteri* from the Ile de France. He considers that this species is identical with the *marginatus* of Gill; the *rhabdotus* of Jenkins; and the *elacate* of Jordan and Evermann. The specimen called *forsteri* in Jordan and Evermann's Hawaiian report, he thinks identical with the Atlantic species *latus.*

In the *Bulletin of the American Museum of Natural History,* Vol. 28, John T. Nichols describes two new blennies from Florida, *Stathmonotus tekla* from Key West, and *Blennius fabbri* from Miami.

In the *Annals and Magazine of Natural History,* 1910, Holt and Byrne describe a new deep-water fish as *Grammatostomias flagellibarba.*

In the *Bulletin of the American Museum of Natural History,* Vol. XXVIII, 1910, Russell J. Coles describes an interesting collection of fishes from Beaufort, N. C. One of these is *Mobula olfersi,* the small devil fish. Several other rare West Indian species are recorded by Mr. Coles.

In the AMERICAN NATURALIST, 1909, E. W. Gudger records a number of species of interesting fishes found also at Beaufort.

In the *Proceedings of the Royal Society of Queensland,* 1910, Mr. J. Douglas Ogilby describes a number of new species of fishes from the neighborhood of Brisbane.

In the *Notes from the Leyden Museum,* Vol. XXXII, Professor Max Weber describes a number of new species of fishes from New Guinea.

In the *Revista do Museu Paulista,* Vol. VIII, 1910, Professor Rodolpho von Ihering describes a number of new catfishes from the neighborhood of São Paulo, in Brazil.

In the *Bulletin of the American Museum of Natural History,* Vol. XXX, 1911, Dr. Charles H. Gilbert describes a number of lantern fishes. One of them, *Lampanyctus nicholsi,* is new, taken near the Falkland Islands.

In *Science,* Vol. XXXI, Dr. George Wagner, of the University of Wisconsin, describes a new Cisco, from Lake Michigan, under the name of *Argyrosomus johannæ.* Of this species a colored figure is given by Jordan and Evermann in the article noticed above.

In the *Annals of Scottish Natural History,* January, 1911, Mr. C. Tate Regan discusses the giant pike of Loch Ken, in Scotland, which reaches a weight of over seventy pounds.

In the *Annals and Magazine of Natural History,* Vol. VII, Mr. Regan discusses the "Systematic Position of the Genus *Macristium.*" *M. chavesi* is a deep-water fish which represents a family related to *Alepocephalus.*

In the same *Annals,* Vol. VIII, Mr. Regan discusses the "Lampreys of the World." He regards *Bathymyzon* as an ordinary lamprey with the teeth feeble. In *Ichthyomyzon* he recognizes two species, *bdellium* and *castaneus,* rejecting the name *concolor* as being based on a larva, perhaps of *Lampetra.* The species, *spadiceus, japonicus* and *wilderi* are referred to the genus *Entosphenus* instead of *Lampetra.*

In the *Annals of the Carnegie Museum,* Vol. VII, 1910, Dr. Jordan describes a series of fossil fishes belonging to the Carnegie Museum, and obtained by Dr. John C. Branner in Brazil. These fishes are from Eocene rocks at Riacho Doce in Brazil. Two new genera are described, *Ellipes* and *Dastilbe,* both of these being based on diminutive herring.

In the *Transactions of the New Zealand Institute,* Vol. XLII, 1909, Edgar R. Waite gives a "Catalogue of Fishes from Kermadec and Norfolk Islands."

In another paper in the same *Annals* he gives notes on various New Zealand fishes.

In the *Annals of the Carnegie Museum,* Vol. VII, Jordan and

Thompson describe a collection of fishes made by Professor J. F. Abbott at Irkutsk in Siberia. Several figures of rare species are given.

In the *Proceedings of the Biological Society of Washington,* William C. Kendall shows that the trout-perch should be called *Percopsis omiscomaycus.* The forgotten name of Walbaum (*Salmo omiscomaycus*) clearly belongs to this curious fish.

In the "Fortieth Annual Report of the Fisheries of Rhode Island," Dr. Henry C. Tracy gives a list of the fishes known to inhabit that state. Among these are several rare forms from the West Indies.

In *Science,* Vol. XXXII, George Wagner discusses the stickleback of Lake Superior, and shows that *Eucalia pygmæa* from Lake Superior is not distinct from the ordinary *Eucalia inconstans.*

In the *Bulletin of the American Museum of Natural History,* Vol. XXIII, 1907, Newton Miller describes the fishes of the Montagua River in Guatemala. The following new species are recorded: *Pœcilia amates, Thyrina meeki, Cichlasoma spilurum, Cichlasoma globosum, Cichlasoma mañana, Cichlasoma acutum.*

In the *Arkiv for Zoologie* Band 4, Ribeiro describes some catfishes from the Iporanga River, near São Paulo in Brazil.

In the *Proceedings of the Biological Society of Washington,* Barton W. Evermann and T. D. A. Cockerell describe three new species of minnows, *Richardsonius thermophilus* from Warm Springs, Ore.; *Notropis kendalli* from Cross Lake Thoroughfare, Me.; and *Notropis universitatis* from Boulder, Col.

In the same *Proceedings,* Mr. Cockerell and Mr. Otis Callaway describe the scales of various minnows of the United States. A subgenus, *Coccogenia,* is established for *Notropis coccogenis.*

In the *Annals and Magazine of Natural History,* Vol. VII, 1911, Mr. Regan discusses the families of Berycidæ and their relationship. He proposes to regard the Berycomorphi as forming a distinct order, and a second order, *Xenoberyces,* is established for the Stephanoberycidæ, Melamphaidæ and other relatives.

In the *Proceedings of the United States National Museum,* Vol. 38, 1910, Professor E. C. Starks and W. F. Thompson review the flounders of the genus *Pleuronichthys,* with two new species, *P. nephelus* from San Juan Islands, Puget Sound, and *P. ocellatus* from the Gulf of California.

In the *Annals and Magazine of Natural History,* Vol. VII, 1911, Mr. Regan discusses the "Anatomy and Classification of the Teleostean Fishes of the Order Iniomi," bringing the various groups into clearer relations with each other. He places the genus *Ateleopus* among the Iniomi.

In the *Philippine Journal of Science,* Vol. V, 1910, Alvin Seale describes a collection of fishes from Borneo.

In the *Proceedings of the Academy of Natural Sciences of Philadelphia,* April, 1910, Henry W. Fowler describes and figures the types of many species of American fishes of the genus *Notropis.*

In the same *Proceedings,* Mr. Fowler describes *Paralepis barracudina,* a new species from Corson's Inlet, New Jersey.

In the same *Proceedings,* Mr. Fowler describes various little-known fishes from New Jersey, and also a number of new species of ganoid fishes. He divides the garpikes into two genera, *Lepisosteus* and *Cylindrosteus.* Instead of the three species usually recognized, Mr. Fowler discussed twelve. It has been evident for some time that the number of species in this group is much greater than the three admitted by Jordan and Evermann. The value of the different species defined by Mr. Fowler, however, is yet to be proved. It will be necessary to have a very large amount of material before these questions of identity can be fully decided.

The species recognized by Mr. Fowler are: *Lepisosteus huronensis, L. osseus, L. treculii, L. clintonii, Cylindrosteus platostomus, C. scabriceps, C. productus, C. agassizii, C. castelnaudii, C. megalops, C. tristœchus, C. tropicus.*

In the same *Proceedings,* Mr. Fowler describes *Dixonina nemoptera,* a new species of albuloid from Santa Domingo. This genus differs from Albula in having the last ray of the dorsal and anal filamentous.

In the *Proceedings of the National Museum,* Vol. 40, 1911, W. C. Kendall describes two very rare species of sole, *Gymnachirus fasciatus,* from Long Key, Fla., and *G. nudus* from Tisbury Great Pond, on Marthas Vineyard. Both are doubtless strays from the Gulf Stream.

In the *Bulletin of the University of California,* Geology, Vol. V, James Z. Gilbert describes a fossil flounder, *Evesthes jordani,* notable for its large mouth, from Miocene rocks near Lompoc, in California. This is one of the oldest-known of fossil flounders, and its relations are evidently with the halibut tribe, and with the genera still represented on the California coast.

In *Science,* Vol. 30, H. H. Newman shows clearly that the killifish *Fundulus majalis* is never viviparous.

In the *Proceedings of the United States National Museum* for

1911, Barton A. Bean and Alfred C. Weed discuss the habits of the electric ray, *Narcine brasiliensis.*

In the same *Proceedings,* for 1911, Dr. Hugh M. Smith and Lewis Radcliffe describe three new species of butterfly fishes from the Philippines.

In the *Mémoires de l'Académie Royale des Sciences et des Lettres de Danemark,* Dr. Hector F. E. Jungersen describes in great detail the anatomy of the pipefishes and trumpet fishes, and their relatives. In this, numerous errors of interpretation made by different authors are corrected, and the paper is one of high merit.

In the *Annals and Magazine of Natural History,* Vol. VII, 1911, Mr. C. Tate Regan discusses the fishes related to the silver gar and flying fish, in the order of Synentognathi. He recognizes two suborders, the one containing the families of Belonidæ and Scomberesodinæ, the other containing the Hemirhamphinæ and Exocœtidæ. He suggests the close relation or possible identity of the fossil genus *Cobitopsis* with *Chriodorus.* Regan regards *Esox lucius,* the supposed *Esox* of Pliny, as the type of *Esox.* He retains *Belone* for the European silver gar, rejecting *Ramphistoma* as a nomen nudum.

In the same *Annals,* Mr. Regan describes the new order Microcyprini, containing the Amblyopsidæ and the Pœciliidæ, each of which families represents with him a distinct suborder. This leaves in the order of Haplomi only three families, the Esocidæ, Umbridæ and Dalliidæ. He thinks that the Haplomi are related to the isospondylous fishes, while the Microcyprini are nearer to the Synentognathi. Mr. Regan notes that the genera *Retropinna, Microstoma* and *Salanx* lack the mesocoracoid characteristics of the other salmon-like fishes. Nevertheless, he regards these along with the fresh-water trout-like fishes of the southern hemisphere, the Galaxiidæ and the Haplochitonidæ, as true Salmonoids, although these latter have also lost the mesocoracoid. The fossil family of Enchodontidæ, Regan regards as an ally of the Stomiatidæ. The Kneriidæ he regards as near to the *Chanidæ.* Regan regards *Panchax* as a genus distinct from *Aplocheilus. Aplocheilus* originally contained two distinct types, but the name was definitely restricted by Bleeker to the group having no vomerine teeth. *Oryzias,* which belongs to the latter group, Regan regards as a synonym of *Haplochilus.* Apparently the short jaws of *Oryzias* should distinguish it from *Aplocheilus,* though it may be identical with some of the African genera.

In the same *Annals,* Mr. Regan discusses the order of Salmopercæ. Beside *Percopsis* and *Columbia,* he adds to this group a genus *Aphredoderus,* this form without an adipose fin constituting a distinct family. He notes that the study of the anatomy of the last genus does not indicate any real affinity with the sunfishes.

In the same *Annals,* Mr. Regan discusses the allies of the genus Cirrhites. In this group he finds five distinct families.

Over thirty years ago, when the great house of Godeffroy, of Hamburg, was dominating the trade of the South Seas, this company undertook the establishment of a natural history museum in Hamburg, and with this the publication of a journal called the *Journal des Museum Godeffroy,* in which the life of the South Seas should be set forth. This journal was sumptuously printed, and illustrated with expensive colored plates. One of the important articles was that descriptive of Andrew Garrett's Fische der Südsee, Andrew Garrett having made an extensive collection of fishes in various islands, and having made colored paintings of a large number of the species. During the time, 1876–1881, the first two volumes of the Fische der Südsee appeared, the author being Dr. Albert Gunther, keeper of the British Museum. The work ended abruptly in the middle of the family of *Labridæ.* The great house of Godeffroy, having undertaken in Europe enterprises beyond its control, went into collapse, and the publication of its journal was suspended. In 1909, under the management of Friedrichsen & Company (publishers), the work has been resumed and brought to completion, with the assistance of Mr. C. Tate Regan, of the British Museum. This has been made possible by the "munificence of the family of Dr. Wilhelm Martin von Godeffroy."

This completed work is a monument to the industry and keen intelligence of Dr. Gunther, and it is the most important treatise concerning the fishes of the region between Hawaii and Borneo known as the South Seas. In the different papers by Jordan and Evermann, and their associates, Snyder, Fowler and Seale, much of the same ground has been covered, and Dr. Günther gives special credit to "the energy" of these American authors in their investigations, particularly of the Hawaiian and Samoan archipelagos. Comparing this work with Jordan & Seale's "Fishes of Samoa," we find a general agreement on all matters where adequate material is present. The American writers generally have given proposed new species the benefit of doubt, by not reducing them to synonymy until it is shown that the new name is a mere synonym. On the other hand, Dr. Günther has consistently left new species in synonymy unless their right to independent rank has been made clear. In general, the British Museum publications have been characterized by the assumption that a species is not valid until it is represented in the collections of the museum. There is room for many differences of opinion in regard to the relation of certain forms, and in regard to matters of nomenclature, but there can be no difference of opinion as to the great value of this work, and as to the accuracy of these fine plates, most of these being copies of the colored drawings of Mr. Garrett.

In the *Zoological Magazine* of Tokyo, Dr. Kishinouye has a paper on the Sparoid fishes of Japan. It is probably a valuable paper, but, being written almost entirely in Japanese, it becomes inaccessible to naturalists of the rest of the world, and it is hoped that this will not establish a precedent, at least unless a résumé in some modern language can accompany the descriptions of new species, and the new material which the writer is able to add.

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SOME RECENT BOOKS ON FOSSIL PLANTS

THE appearance within two years of three general works on paleobotany, is a sufficiently marked indication of the great interest which this phase of botany at the present time is exciting in England.[1] Much of the most important work which is now being published by the British botanists deals with fossil plants.

The English botanist is in some respects at a great disadvantage compared with his American colleagues. The comparatively meagre flora of the British Islands has already been exhaustively studied, and is a strong contrast to the extensive and varied flora of North America, which, except in the older parts of the country, still offers a rich field to the systematist and plant-geographer, as well as to students of morphology and physiology. This difference in the natural advantages of the two countries no doubt explains to some extent the greater interest in fossil plants shown by the English botanists. But unquestionably much more important is the availability of great collections of important fossils awaiting investigation; and the important

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[1] Scott, D. H., "Studies in Fossil Botany," 2 vols., London, Adam and Charles Black, 1908–9. Seward, A. C., "Fossil Plants," Vol. II, Cambridge University Press, 1910. Stopes, Marie C., "Ancient Plants," Blackie & Son, London, 1910.